CSIR-National Metallurgical Laboratory

Jamshedpur, India

From the Director's Desk

Chairman & Members of the Research Council, Invitees and Dear Colleagues,

I welcome you all to the 63rd Research Council meeting of CSIR-NML, which is also the final meeting of the current research council. This Research Council has been in place for close to three years now, and I must record my deep gratitude to the council for steering the laboratory in a direction that I was committed to and providing constructive technical and policy inputs that has enabled us to maintain excellence, remain relevant to the stakeholders and create a stimulating ambience for creativity and innovation to flourish. Our chairman Shri H M Nerurkar has been a pillar of support and inspiration and it feels great for me to stand on his broad shoulders. The members of the Research Council, many of whom have been associated with CSIR-NML for several years have nurtured CSIR-NML with passion and vigor and I am indebted to them. Three years back, we embarked on a renewed vision and mission (Vision@2022) of a self-sustained technology centre by the year 2022 that would enable us to be more relevant and accountable and set clear goals with timelines towards this. The goals and targets that we set ourselves for 2016 were :

- Achieve 50 % of NML's total budget from industrial sponsorship
- Achieve 80% direct utilization of man-power and major equipments
- Develop and commercialize five technologies that will have a lasting impact
- Realize 5% of operational budget from IP licensing and royalties
- Move towards a paperless NML
- Deliver on one national mission project

Since the launching of AcSIR, we had also added two more goals for 2016, namely:

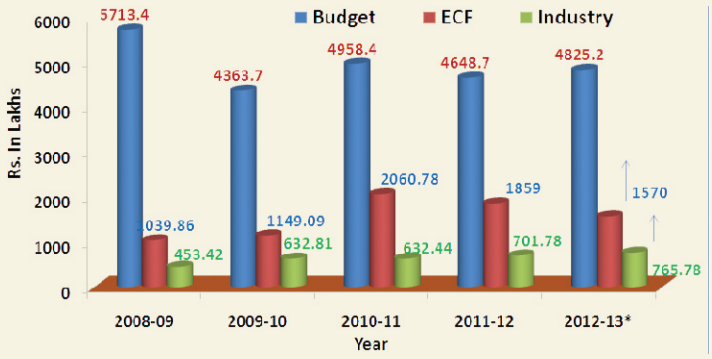
- Produce 20 PhDs/year from CSIR-NML through AcSIR
- 150 SCI publications/yr with an average citation of 8/paper

In the three years that has gone by, we have to introspect and view through the prism of time whether we have remained committed to this vision and are on course to achieving these Goals and Targets that we set ourselves. I will briefly present on where we stand with respect to these goals.

50 % of NML's total budget from industrial sponsorship

The external cash flow (ECF) as well as the fraction of industrial funding against the annual budget over the past five years is depicted below :

Budget, ECF and Industrial ECF

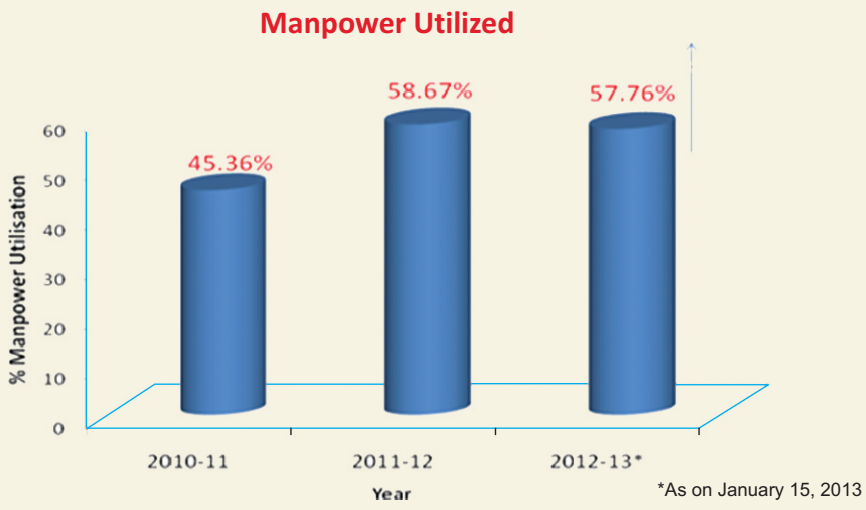


*As on January 15, 2013

Our strategy towards the attainment of 50% of the CSIR-budget from industrial funds by 2016 is 3-fold: i) To emphasise more on industry sponsored projects in preference to individual grant-in-aid projects and to apportion 50% of man hours to industrial projects; ii) Large value CSIR and grant-in-aid projects to be taken up mainly for technology development in partnership (30-50% financial stakes) with industries and iii) To reduce the annual budget through judicious spending. It is seen that over the past three years, the extent of industrial funding has increased by 20-30% each year although the net ECF has dropped marginally. By March 2012-13, the net ECF is expected to touch Rs 19-20 crores against a budget of Rs 50 crores, of which the industrial component of ECF is expected to be Rs 9 crores. Therefore, for realization of 50% of the CSIR-budget from industrial funds by 2016, it would be necessary to maintain a 30% growth rate of industrial ECF over the next four years. Although this is a tall order, it is achievable if we stay focussed and work hard.

80% direct utilization of man-power and major equipments

The utilization of scientific manpower as measured by the total time booked and costed to the projects (recorded through a MIV system) over the past three years is illustrated below:



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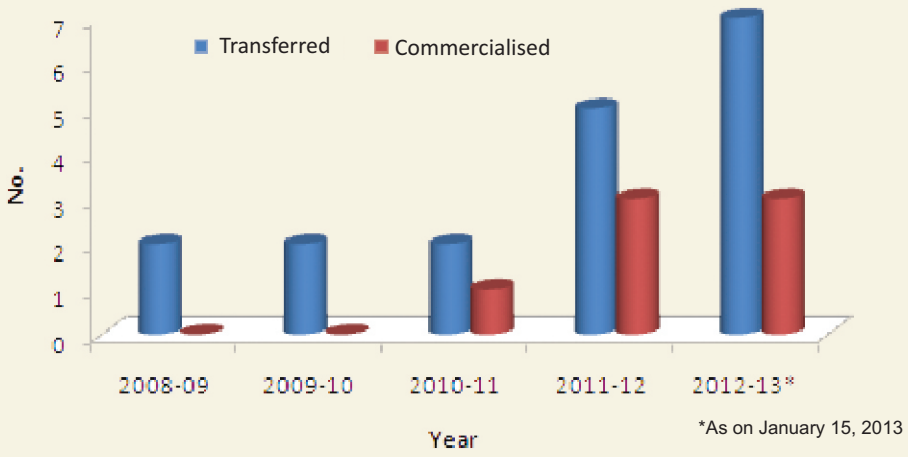
Presently, we have a scientific man-day utilization factor of 58%. Since this data precludes the man-day involvement in all service and administrative activities and includes only the man-hours booked to various R&D projects, the actual manpower utilization is much higher. We are hopeful that by 2016, the direct man-days utilization booked to R&D projects will go up to 80% with the balance 20% being utilized for service and administrative responsibilities. However, on the equipment utilization front, although we have created systems for the time booking on all equipments, many of my colleagues have been hesitant to bring all major equipments within the ambit of the online time booking system. Consequently, we have thus far not been able to establish a foolproof system of measuring the actual utilization of equipments. A systemic correction is required to enforce the equipment time booking.

Develop and commercialize five technologies with lasting impact

On the development and commercialization of impact making technologies, we have done reasonably well over the past three years. The most popular technology from CSIR-NML in the past decade has been the column flotation technology which has four commercial installations thus far i.e., at M/s. Indian Rare Earths at Chatrapur, Orissa and Chavara, Kerala for beneficiation of sillimanite, at M/s. Calpro

Technologies Transfered & Commercialized



*As on January 15, 2013

Ltd., Salem for beneficiation of limestone and at M/s. Indian Barites Ltd., at Mangampet for the beneficiation of barite. At least three more commercial installations are expected within the next three years. The other major technologies commercialized over the past three years are :

1. Synthetic nano-crystalline hydroxyapatite and tri-calcium-phosphate. This product is presently being marketed by two companies: M/s. Eucare pharmaceuticals under the brand name of Sybograph and Sybograph+ as well as IFGL. An agreement has also been signed with M/s. Surgiwear for the marketing of some biomaterials.

2. The technology for the production of pavement tiles from LD slag, blast furnace slag and fly ash has been commercially operational for almost a year by M/S Jajil Enterprises. The pavement tiles supplied by them have been laid in several areas within the premises of Tata Steel. With the qualification of these tiles by JUSCO for installation in township areas, this technology is likely to make a significant impact in the future.

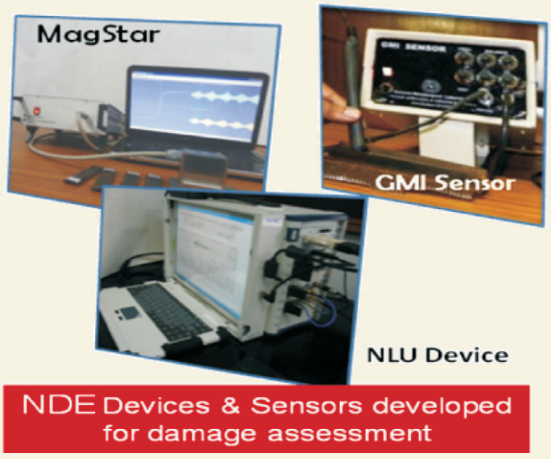
3. The automated portable ball indentation equipment (PABI) designed and developed by CSIR-NML and transferred to M/s. Ducom Instruments for marketing has found successful commercial installations at several industries including BARC, BHEL, IOCL and NTPC.

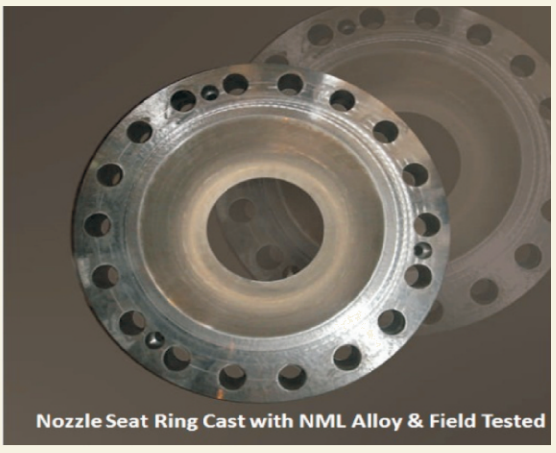
4. The lacquer developed at CSIR-NML for brass artifacts has been field tested, qualified with respect to all parameters by the RTC Laboratory, Metal handicrafts service center at the Moradabad Brass Cluster and has been utilized by a large number of artisans and exporters. Since this activity is in close association with the National Innovation Council and meant more for public good than commercial interests, a mechanism for its distribution through the establishment of a company is being worked out.

Three of the above technologies have found mention in the 70 most outstanding technologies of CSIR with industrial impact brought out on the occasion of the 70th year foundation day function of CSIR.

A few other technologies that have been transferred recently and are expected to be commercially exploited soon are :

1. Technology for remaining life assessment of components in power plants and petrochemical industries through simultaneous measurement of the magnetic hysteresis and Barkhausen noise. An equipment for this purpose (MagStar) has been designed, prototype tested and transferred to M/s. Technofour Pune for marketing.
2. The technology for Giant Magneto-Impedance (GMI) sensors has been transferred to M/S Rtech Instruments, USA for marketing. This is also being field evaluated at Indian Oil Corporation Ltd.
3. A technology for production of Yellow Tungsten Oxide (YTO) & Cobalt-Hydroxide from tungsten carbide hard metal scrap has been developed by CSIR-NML and transferred to M/s Bharat Futuristic Corporation, Bangalore. They are expected to start commercial production soon.
4. Electrolytic manganese metal from Mn ores for M/s. Manganese Ore of India Ltd.





A few technologies that have been developed in recent times and have scope for commercial exploitation are:

1. Silt erosion resistant steel for hydel power plants. This has been developed

and successfully field tested. It is expected to be commercialized by BHEL and NHPC in due course of time.

2. High purity iron oxide for pigment and application in magnetic devices from a variety of wastes including pickle liquor, titanium waste, copper slag etc.
3. Technology for standard grade ferrosilicon from Banded Hematite Quartz and Jhama Coal developed jointly by CSIR-NML and Tata Steel.
4. An energy efficient coke-based furnace for the melting of brass. This has been developed and is in the process of being transferred to the Moradabad Brass Cluster through the office of the National Innovation Council.
5. Electrolytic production of sodium metal.
6. A technology for the detection and sorting of alumina bearing iron ores by thermography.

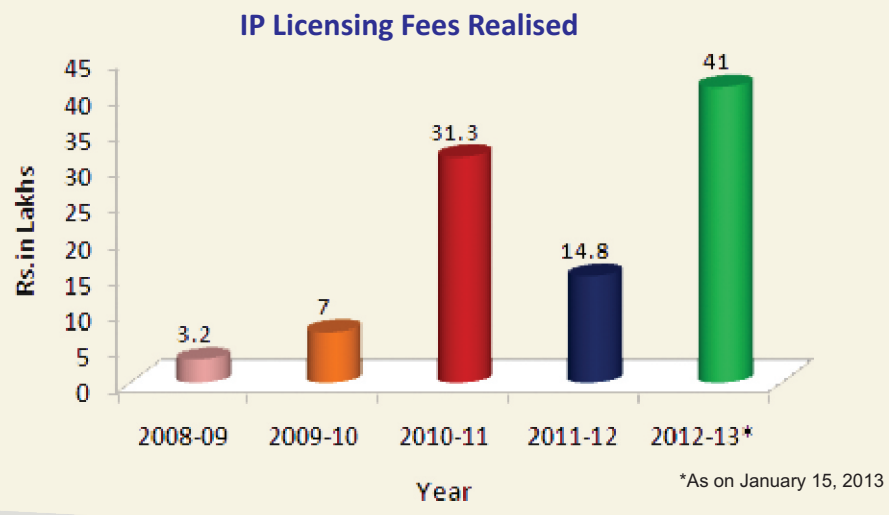
The major technologies that are proposed to be developed at pilot scale over the next four years are:

1. Technology for Cold Rolled Grain Oriented Steel (at 3-5 ton scale) in partnership with Tata Steel, Ministry of Steel, Rashtriya Ispat Nigam Limited and M N Dastur Ltd.
2. Technology for the economic production of Magnesium from dolomite using a new thermal process.
3. Technology for the dry beneficiation of thermal coal.
4. Technology for the extraction of cenospheres and energy critical elements from fly ash.
5. Technology for production of pig iron, slag wool and electricity in a low shaft furnace from iron ore slimes and Jhama coal in partnership with Tata Steel and Polybond Ltd.
6. Technology for production of DRI using iron ore slimes and Jhama Coal in a tunnel kiln in collaboration with Tata Steel.
7. Technology for the extraction of rare earth metals from secondary resources.

From the perspective of high impact technology development and its commercialization, I have no doubt that we will far exceed the goals and targets set for 2016.

5% of operational budget from IP licensing and technology transfers

The revenue realized from technology transfers and IP licensing over the past five years is illustrated below :



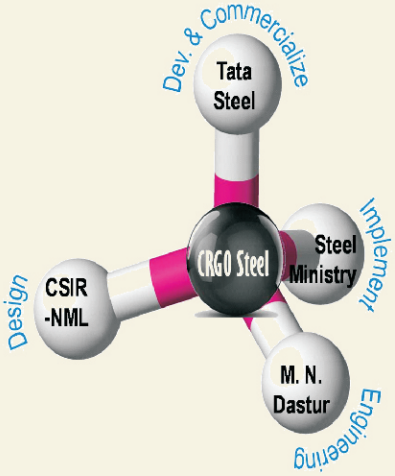
*As on January 15, 2013

Our operational budget as on date is ~Rs 20 crores/year and 5% of the operational budget amounts to ~Rs 1 crore. Looking at the spectrum of technologies that are expected to be commercialized by 2016, and our renewed thrust on IP jointly with the industries, it may not be very difficult to achieve the set target by 2016.

A paperless NML through ICT Enterprise Transformation Initiative

An ERP system has been implemented at CSIR-NML under the ICP transformation initiative of CSIR named Project ONE CSIR. This was inaugurated by Shri Vayalar Ravi vice president of CSIR on 25th September 2012 at CSIR HQ New Delhi. The ERP system has seven modules in it covering human resource, e-learning, research and development, policy & programmes, materials management, finance management and project management. Most of the data entry required in various modules has been completed at CSIR-NML and the ONE CSIR portal is presently operational. In addition to the CSIR portal, we have taken independent initiatives on biometric attendance and leave system, automated security surveillance, RF-ID tagging of all stores inventory etc. which would be integrated with the ERP system in course of time. Our journey towards paperless office has taken great strides forward and it is expected that within the next two years, CSIR as a whole and CSIR-NML in particular would have moved to a completely paperless office. NML has also launched a transparency portal in the first week of May 2012. The portal contains all information pertaining to staff (pay & allowances, immovable property held, foreign and local travel undertaken, honorarium received), project details, expenditure pattern, CAG report, R&D information, data on local purchase, works and services etc.

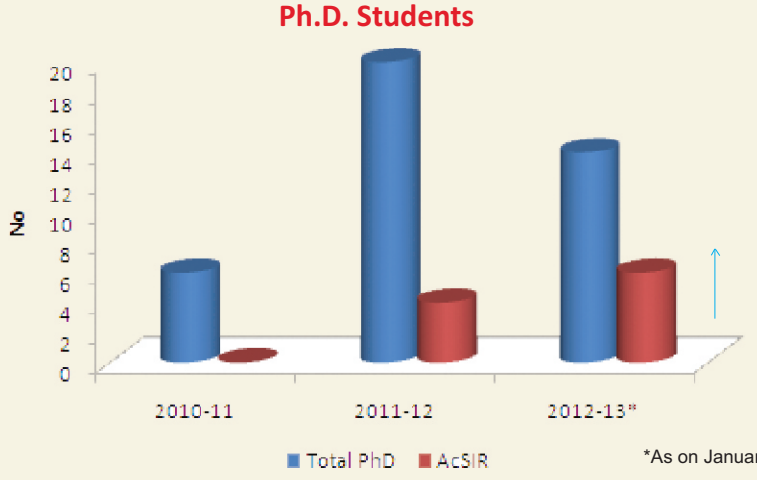
Deliver on one national mission project



CSIR-NML in collaboration with Tata Steel, Ministry of Steel, Rashtriya Ispat Nigam Ltd. and other stakeholders have initiated a national mission project on the development of CRGO steels. This was identified as a priority area under the 12th plan both by Ministry of Steel and Ministry of Power. The project has been approved in-principle and finances committed by CSIR, Ministry of Steel and Tata Steel. The project has presently been put up to the Expenditure Finance Committee of the Govt. of India for approval and is expected to be officially initiated soon. However, work towards the development of new compositions, novel inhibitors, slab casting, hot and cold rolling parameters etc. has already commenced.

Produce 20 PhDs/year from CSIR-NML through AcSIR

The status of the number of students from CSIR-NML registered for PhD both under AcSIR and other institutes is provided below:



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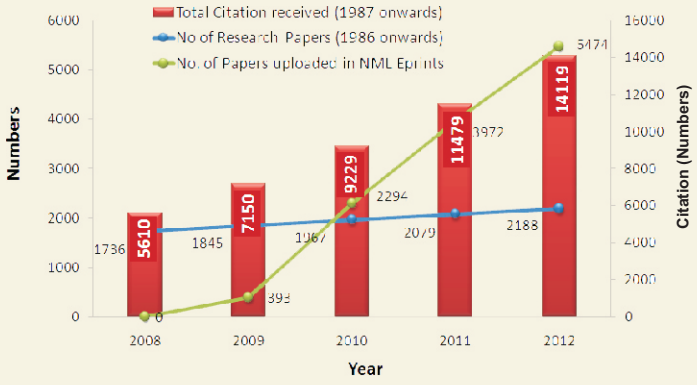
Although the average number of students registered for PhD in various institutions has ranged between 15 to 20, the intake of PhD students at CSIR-NML under AcSIR has been lesser. The minimum admission criteria for registration of PhD under AcSIR is a CGPA of 8 and successful qualification in NET or GATE exams. Because of the higher benchmark for admissions and because PhD at AcSIR at NML is restricted to materials engineering discipline, the response has been lukewarm. However, with the provision for the registration of external candidates, advent of NET in Engineering and an advertisement of the brand value of NML, we are hopeful that soon we will be able to achieve the set target of 20-25 Ph.D. admissions per year to CSIR-NML under AcSIR.

150 SCI publications/ yr with an average citation of 8/paper

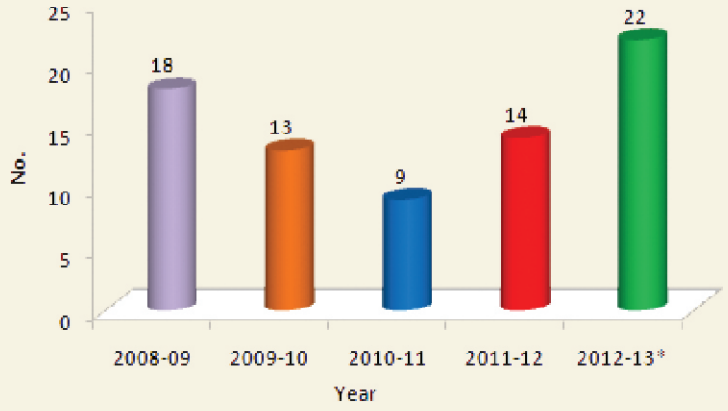
The trend of SCI publications and citations over the past five years is depicted below:

Significantly, the number of SCI publications over the past two years has not showed any improvement. Except for 2010, when 122 SCI papers were published, the

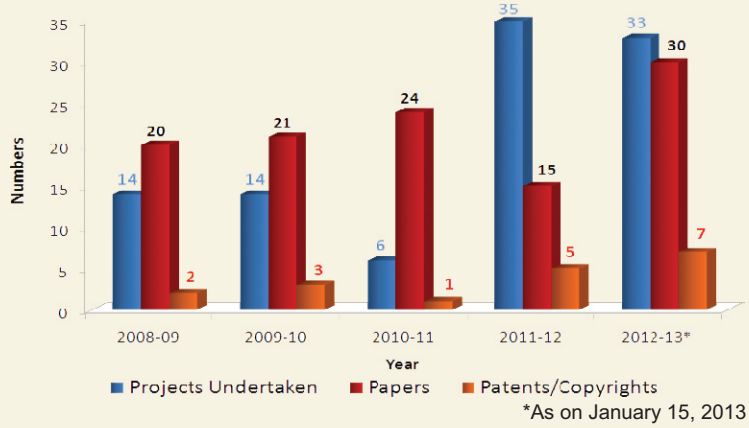
SCI Publications



Patent Filed



In-House Projects



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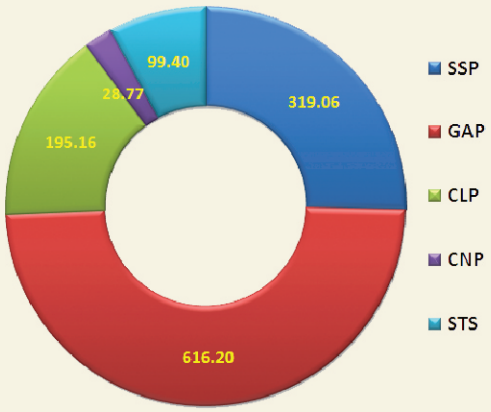
average SCI publications count has remained close to 110 in the past five years. This has to be looked at from two viewpoints: Firstly, publications arise mainly from creative research and generally technology development initiatives do not result in SCI publications. Technology development efforts tend to result in a larger number of patents as evident from the trends in the number of patents filed over the past five years. Secondly, an analysis of the Grant-in-Aid projects and internal projects at NML since 1995 indicates that most publications result from individual research of students or young scientists supported through Grant-in-aid or in-house projects. Our conscious policy of discouraging individual Grant-in-aid projects to focus on technology development might have contributed to the decrease in publications. However, we are trying to offset the decrease in individual grant-in-aid projects by liberal support of in-house projects as evident from the trends in the number of internal projects undertaken over the last five years shown above.

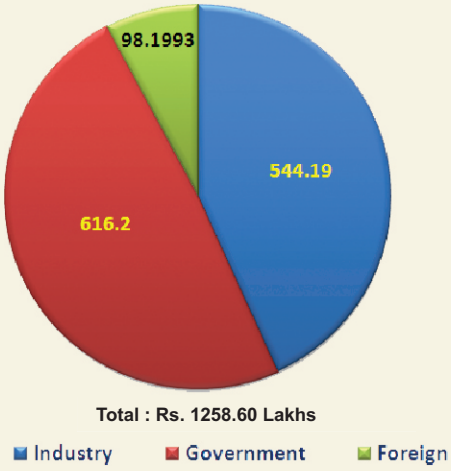
The publication count is also expected to increase with an enhanced student's intake into AcSIR. With these initiatives in place, we are hopeful of increasing our footprint of SCI publications and achieve the set target by 2016.

Performance in the Last Six Months

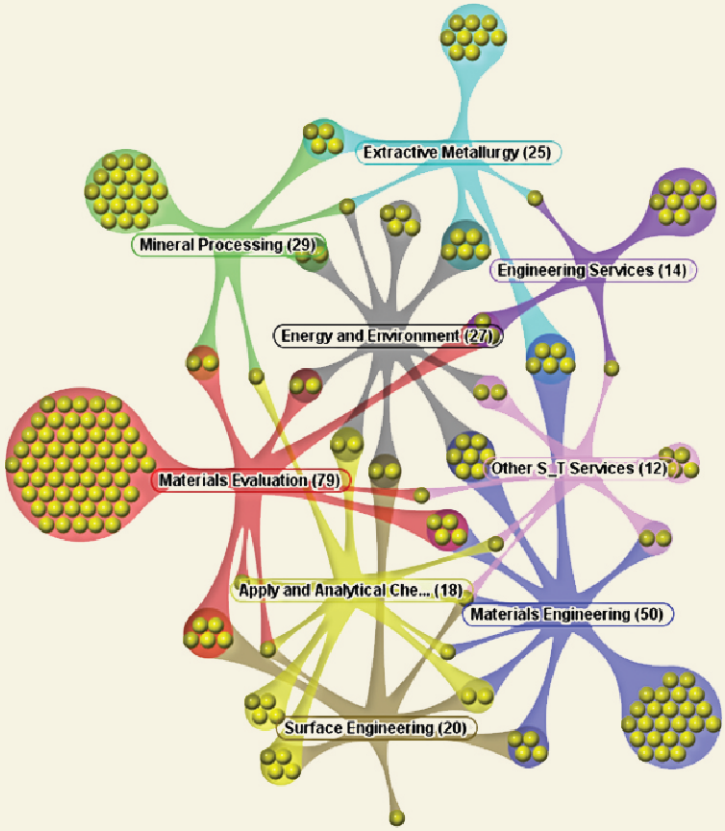
The External Cash Flow of CSIR-NML during July to December, 2012 and its distribution among the various categories of projects is depicted in the figures.

External Cash Flow

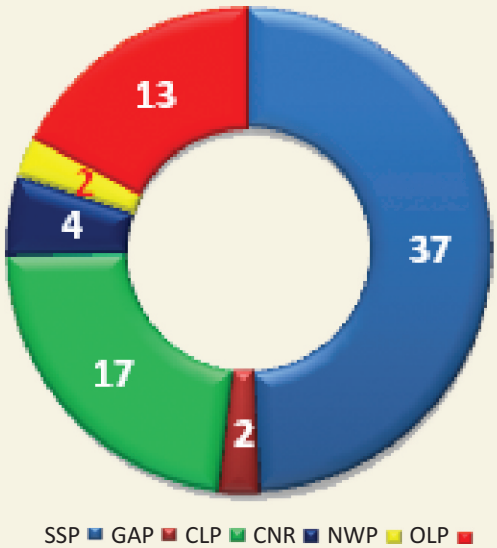




Fifty one SCI papers were published and 11 patents filed during this period. The number of citations which as on date is 14119 for 2188 publications (1986 onwards)



On-going Project from different Industrial Sectors



On-going Projects

(As on January, 2013)

six technologies have been transferred during this period.

The activities pursued under all the ongoing projects as well as the progress made vis-à-vis the deliverables are given in detail in the RC agenda papers. However, I wish to highlight some significant outcomes from some of the sponsored projects in the past six months:

1. A process flow sheet at pilot scale for producing sinter feed with 62% Fe and pellet feed with 63% Fe was developed for M/s. Usha Martin Co. Ltd. This will soon be commercially implemented by M/S Usha Martin.
2. A process flow sheet at pilot scale for the beneficiation of low grade magnetite iron ores from Monaco was developed for M/s. Earthstone Iron Ore Resources, UAE.
3. A column flotation process was developed for non-coking coal fines for GE India Technology Centre (JFWTC).
4. A flow sheet for the beneficiation and agglomeration of chromite ore from Oman was developed for M/S Bahar Oman Holding LLC, Muscat.
5. A process for the production of DRI from iron ore slimes and Jhama Coal has been developed jointly with Tata Steel. Pilot scale evaluation of this process has been initiated.
6. A 500 Amp electrolytic cell for the production of sodium was operated continuously for close to 15 days and 15 kg sodium produced. Design and fabrication of a 2000 Amp pilot cell for commissioning at HWP, Baroda has also begun.
7. Bench scale process flow sheet developed for the production of electrolytic manganese metal (EMM) with current efficiencies >65%.
8. A process to control the inclusions in high C-steel used for wire drawing has been developed jointly with Tata Steel.
9. The silt erosion resistant steel developed by CSIR-NML has been successfully field tested. BHEL is in the process of installing 4 guide vanes cast from this steel at Baira-Siul hydel power station.
10. A novel controlled atmosphere annealing simulator has been designed and developed jointly with Tata Steel for real size steel tensile test specimens.
11. An ultrasonic technique for surface and sub-surface residual stress measurement of HSS rolls has been developed jointly with Tata Steel and implemented at the plant.
12. The lacquer developed at CSIR-NML is being utilized by several artisans and exporters at the Brass Cluster in Moradabad.
13. A thermally efficient coal-based furnace designed and developed at CSIR-NML is being implemented among the artisans of the Brass cluster at Moradabad.
14. Al-coatings to replace Cd-coatings by sputtering as well as through ionic liquids have been developed for BOEING, USA.
15. A thermography technique has been developed for high alumina iron ores.

12th Plan Projects

Another landmark has been the enthusiastic initiation of the major 12th plan projects. I will provide a short status report on the three major 12th plan projects that CSIR-NML has taken up with financial partnership of the industry.

Development of Zero Waste Technology for Processing and Utilization of Thermal Coal (Industrial Partners: Tata Power, Ecofren Synergy Pvt. Ltd., JSPL)

The project aims at developing a technology at pilot scale for dry beneficiation and washing of thermal coal. Utilization of combustion products (fly and bottom ash) are also targeted in this project. Fly ash contains valuables in terms of cenospheres and several strategic trace metals. This project aims at technology development for the recovery of these trace metals. The deliverables in this project are:

1. Technology to produce clean coal with 34% ash and 25% ash by dry processing (5-10 ton scale)
2. Wet processing scheme for recovering combustibles from the rejects of the dry circuit (50-100 kg scale)
3. Green technology for enhanced utilization of coal combustion products through geopolymerization (1 ton scale)
4. Technology for recovery of cenospheres from fly ash (5-10 kg scale)
5. Process for recovery of rare metals from fly ash (1 kg scale)

Some progress has been made in raw material collection and characterization, literature review and infrastructure development aspects.

Development of commercially viable magnesium metal production technologies (Industrial Partner: Tata Steel)

The proposed project aims to develop an energy efficient, cost-competitive and eco-friendly commercially viable Mg production technology through electro-thermal process exploiting indigenous raw materials. The goal is to enable commercial production of Mg (~97-99% purity) in India at a price cheaper than that of China.

The development will be carried out in 2 phases: (i) at a 300 Kg capacity (raw material) pilot plant working in batch mode. (ii) at a pilot plant of 1 ton capacity (raw material) working in semi-continuous mode with a basic engineering package. For the 1st phase electro thermal process modelling comprising thermodynamic data collection, creation of geometry & meshing of the system in GAMBIT, has been completed. The detailed design, procurement of long cycle items/materials, and servicing/reconditioning of old components of existing pilot plant were finalized. In the coming 6 months, fabrication, machining, refractory shaping, technological structure, assessment of the full system at the supplier site and then the full system integration, installation at NML site and commissioning trials have been planned. Moreover the regular campaigns to establish the process parameters of magnesium production will be started. Raw materials for the pilot campaign are being procured. The calcination of dolomite in the pilot scale rotary kiln and its standardization are being carried out.

Development of technology for Cold rolled grain oriented (CRGO) electrical steel (Industrial partners: Tata Steel, RINL)

The objectives and scope of this project are :

1. Development of Technology for CRGO steels, at 3-5 T pilot scale level, having the following properties: CRGO steel sheets having the average misorientation angle between the cube edges (<001> axes) and the rolling direction of 3^0; Final product of around 0.3 mm thick sheet or lesser with a grain size of 3-10 mm. Maximum core loss at 1.7 T is reported to be of 0.7 W/Kg which is being aimed to reduce 0.6 W/Kg
2. Development of integrated pilot facility comprising of thin slab casting, annealing, hot rolling, cold rolling, magnetic annealing and coiling at 3-5 ton scale for flat products on a pilot scale
3. Enable commercial production of CRGO steel in India

Detailed white space analysis to identify the available white space in composition, slab casting, inhibitors, hot and cold rolling parameters and in recrystallization annealing has been carried out. Experimental work has been initiated on a detailed characterization of the CRGO samples received from Chorus.

We remain absolutely committed to not only deliver our technology promises but also to translate them into commercial reality and create an impact.

Patents Filed

In the last six months, 11 patent applications have been filed. Among these, five applications are jointly with Tata Steel Ltd and two with Sterlite Industries Limited. These are: (1) An improved process for the conversion of hematite to magnetite using hydrogen gas, (2) A process for development of Zn-Ni-Cu coatings for antibacterial and fuel tank application, (3) A process for the application of thin layer of zinc coating by plasma spraying on steel reinforcement bars to control corrosion in concentrate environment, (4) An improved coke based Energy Efficient Non-ferrous Melting Furnace, (5) A process for production of various shapes and size of high purity mono-dispersed iron oxide from waste chloride pickle liquor, (6) An Improved process for preparation of Pellet-Sinter composite Agglomerate (P-SCA) of iron oxide fines for use in blast furnace, (7) An Improved reactor for the desulphurization of hot metal by directly generated Magnesium utilizing the heat available in the hot metal, (8) An improved process for the conversion of hematite to magnetite using ammonia gas, (9) An improved process for the production of titanium oxide and metallic iron from ilmenite, (10) A semi-commercial process for the production of ferrosilicon from copper slag using metallurgical coke as reducing agent, (11) A semi-commercial process for the production of ferrosilicon from copper slag using charcoal as reducing agent.

Institutional Repository

The NML Institutional repository (http://eprints.nmlindia.org) has maintained its global visibility and popularity with average hits of over 0.3 million/month and a cumulative total of over 5.78 million hits since inception. More than 150 countries had the access and downloaded document.

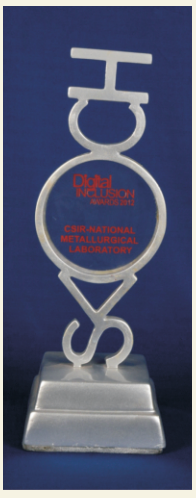
MoUs/Agreements Signed

Since the previous Research Council meeting, a large number of MoUs were signed with various clients including several international organizations. These are: (1) Providing technical expertise to CARIRI for study of Corrosion Failure Problems of Industries in Trinidad & Tobago -M/s. Caribbean Industrial Research Institute, Trinidad & Tobago, (2) Assessing the corrosion of metal in the water path and underwater turbine parts and suggestion for selection of corrosion resistant system for Kopili HE Plant-M/s. North Eastern Electric Power Corporation Limited, Shilong, (3) Water Treatment Process for Arsenic and Iron Removal - M/s. Fecon Engg. Pvt. Ltd., Kolkata, (4) Non-Disclosure-Agreement (NDA)- M/s. Aditya Birla Science & Technol, Raigadh, (5) Information disclosure agreement- M/s. Vacuum Techniques, Bengaluru, (6) The Board of Trustees for the Port of Kolkata - M/s. Kolkata Port Trust, Kolkata, (7) Marketing of Offline Simulator, FERALSIM - M/s. Auto Fibre Craft, Adityapur, Jamshedpur, (8) Computer aided simulation of magnesium reactor- M/s. IIT-KGP, Kharagpur, (9) Process for producing iron from Jhama Coal and iron ore slime (Amendment agreement 355)- M/s. Tata Steel Limited & Polybond, Bhilai, (10) R & D in areas of mutual interest- M/s. Indus Smelter, Chhatisgarh, (11) Non Disclosure Agreement - M/s. Akzo Nobel India Ltd., Kolkata, (12) Mutual Confidentiality Agreement - M/s. Eaton Corporation, Maharashtra (13) Memorandum of Understanding- M/s. Korea Maritime University (KMU), South Korea (14) Development of Giant Magneto Impedance (GMI) based NDT tool for

detection of carburization in austenitic stainless steels - M/s. Indian Oil Corporation Ltd., Mumbai, (15) Analysis of raw material products generated during different stages of EOL-EEEs Recycling - M/s. Eco Recycling Ltd., Mumbai, (16) Physical & Hydrometallurgical beneficiation of poly cracker ash to enrich the metal concentrate- M/s. Eco Recycling Ltd., Mumbai, (17) Development of Synthetic Flux through self propagating sintering of LD Sludge - M/s. Ministry Of Steel, New Delhi, (18) Technology Licensing for Commercial Manufacture of MagStar equipment- M/s Technofour, Pune, (19) Non Disclosure Agreement - M/s. GE India Technology Centre Pvt. Ltd, Banglore, (20) Process for manufacture of Ammonium Paratungstate - M/s. PSB Chemicals Pvt. Ltd., West Bengal, (21) De-phosphorization of steel - M/s. Adhunik Alloys & Power Ltd., Jamshedpur, (22) Rare Earth separation and recovery from Korean Manazite/REOs - M/s. KIGAM, Korea, (23) Roasting of Vanadium bearing slag for the production of V_2O_5- M/s. Star Industries, Delhi, (24) Consultancy services towards providing scientific/ technical expertise- M/s. JSW Steel Limited, Karnataka, (25) Confidential Disclourse Agreement- M/s. Huntsman, Malaysia (26) Development of GMI Sensors - M/s. Rtech Instruments, USA, (27) Coated steel product performance evaluation- M/s.Tata Blue Scope Steel, Pune, (28) Non-Disclosure Agreement - Timken Company, USA (29) Water Treatment Process for Arsenic and Iron Removal - M/s. Solar Industries, Ranchi. One of the agreements on "Industry sponsored joint research and development" signed with M/s. General Motor (GM), USA was terminated on mutual agreement because of the winding up of the Indian R&D centre at Bengaluru.

Awards / Distinctions/ Fellowships Received

- CSIR-NML received the "Green Apple Environment Award 2012". The award was presented during a carbon-neutral presentation ceremony at The House of Commons, Place of Westminster, London on 12th November 12, 2012.
- CSIR-NML Team won CSIR-ERP Golden Icon Award 2012.
- CSIR-National Metallurgical Laboratory was awarded the Skoch Digital Inclusion SILVER Award 2012 under Networking and Management category under the Central Government Sector for the project, "WeBSYS-Information Management and Analysis System".



- CSIR-National Metallurgical Laboratory was awarded the Skoch Digital Inclusion Merit Awards 2012 for the two projects - (1) "WeBSYS-Information Management and Analysis System" and (2) “Open access docoment delivery system”.
- Dr S. Tarafdar, has been elected as a "Fellow of the Indian National Academy of Engineering (INAE)" from January 1, 2013.
- Dr Suman Kumari Mishra, received the "2012 Metallurgist of the Year Award" instituted by the Ministry of Steel, Govt. of India.
- Mr. Arpan Das, received the "2012 Young Metallurgist of the Year Award " instituted by the Ministry of Steel ,Government of India.
- Dr. Raghuvir Singh, was awarded the NIGIS Award for Excellence in Corrosion Science & Technology for the year 2012.
- Dr. Ratnakar Singh received the "Engineering Achievement Award" of the Institution of Engineers, Jamshedpur Chapter.
- Dr. S. Palit Sagar received the "Lady Engineer Award" of the Institution of Engineers, Jamshedpur Chapter.
- Dr. S.Srikanth received the "Distinguished Engineer Award" of the Institution of Engineers, Jamshedpur Chapter.
- Dr. Sanjay Kumar and Shri Sushanta Nath, received the Certificate of Merit from MUSCO Steel for their case studies on Innovation in Waste - Reuse.
- NML scientists and research fellows won seven awards for oral and poster presentations in the 62nd Annual Technical Meeting of IIM held in November 2012.
- Dr. S. Srikanth, has been elected as Fellow of The Institution of Engineers (India), (2012).
- Dr A Bandopadhyay, Scientist has been admitted as a "Fellow of the Indian Institute of Metals", Kolkata.
- Dr. A.K.Panda, Dr. G.V.S.Murthy, Dr. R.K.Roy and Dr. S.Palit Sagar, received the "Best Technical Paper award in Industrial Application" for the paper titled "Generation of Guided Waves Using Magnetostrictive Nanostructured Sensing Elements for Pipe Inspection" and published in *Journal of Non-destructive Testing & Evaluation* during the year 2011 - 12.
- Mr. A. Metya and Dr. Sarmishtha Palit Sagar won the first prize in the poster presentation at the National Seminar and Exhibition on Non-Destructive Testing & Evaluation held in Delhi during December 10-12, 2012.

Distinguished Visitors

- Dr. Stephen Gaydos, Boeing, USA delivered a lecture on "Development of environment friendly Inorganic and organic finishes and minimization of corrosion in aircraft" at CSIR-NML on October 15, 2012.
- Dr. Sardari Lal Mannan, Consultant, Materials Group, Gas Turbine Research Establishment, Bangalore (Formerly Outstanding Scientist & Director, Metallurgy & Materials Group at the Indira Gandhi Centre for Atomic Research, Kalpakkam) delivered a lecture on "Creep Deformation and Fracture" CSIR-NML on October 3, 2012.
- Dr.A.M.Zhyzhaev, Institute of Chemistry and Chemical Technology, Krasnoyarsk Science Centre, Russia delivered a talk on "The study of processing mineralogy and Zinc/Lead separation from ore of the Siberia Polymetallic deposit" at CSIR-NML on December 13, 2012.

- Prof. Sugata Adhikari, SQC and OR Unit, ISI, Kolkata delivered a lecture on "Role of Statistics in Scientific and Engineering Research" on July 27, 2012 at CSIR-NML.
- Mr. Aparup Sengupta, Managing Director and Global CEO of Aegis Ltd. delivered a lecture on "Leadership and Life" on July 24, 2012.
- Prof. G.G. Roy, Department of Metallurgical and Materials Engineering, IIT Kharagpur, delivered a lecture on "Cored Wire Injection in Steel Melt" on July 18, 2012.
- Dr. R. Sunder, India Biss (P) Ltd., Pennya Industrial Area, Bangalore, India delivered a lecture on "Sequence Sensitive Threshold Stress Intensity and its Characterization" on July 9, 2012.
- Mr. Georg Greifzu, Technische Universität Bergakademie Freiberg, Germany, Visiting Researcher under the program "Internship for Foreign Students in CSIR Labs." delivered a lecture on "Mechanically induced reactivity of hydrothermally prepared Boehmite (-AlOOH)" on July 24, 2012.

Foreign Deputation

- Dr. G.V.S. Murthy, was deputed to USA to participate in 35th Annual Review of progress in quantitative QNDE, Denver during July15-20, 2012.
- Dr. S. Prabhakar, was deputed to Zambia to participate in the joint visit by CSIR-NML and McNally, Bangalore, India to study KCM's Zambia column flotation cell during July 15-25, 2012.
- Dr. A.K. Mohanty and Dr. Jayant Konar, were deputed to Germany for attending "Training on X-ray Fluorescence (XRF) instrument operation" at M/s. Bruker AXS, Karlsruhe, Germany during September 3-7, 2012.
- Dr. Mita Tarafder, was deputed to South Korea to attend 8th symposium on Standard Reference Data, Daejeon, at KIGAM South Korea during September 3-12, 2012.
- Dr. J. Chakraborty, Scientist, was deputed to Germany to attend the International Conference on Residual Stresses (ICRS-9) at Hanh-Meitner Inst Berlin during October 4-13, 2012.
- Dr. B.D. Pandey and Dr. K. D. Mehta were deputed to Russia for Bilateral exchange visit under ILTP (Indo-Russian) to Int. Sci. Centre Organization Extrem, States Res. Krasnoyarsk during October8-18, 2012.
- Dr. Manish Jha was deputed to China for attending the Exhibition and Plant tour organized by world recycling forum, Guangzhou & Hong Kong during Nov. 11, Dec. 16, 2012.
- Dr. Sanjay Kumar was deputed to Spain for a short term fellowship on research excellence at USC-India (PEIN), Univ. Santiago de Compostella during Dec. 8-23, 2012.

Human Resources

Four employees retired in the past six months. They are Shri Sashi Bhushan Singh, Lab. Assistant, Shri Sona Ram Mahato, Security Guard, Shri Shyam Lal, Lab. Assistant, Shri K.V. Lakshman, Sr. Technician

AcSIR Activities

Under the AcSIR, CSIR-NML has initiated PhD/Integrated PhD programs in the emerging and trans-disciplinary areas of Materials and Metallurgical Engineering, broadly involving mineral processing, primary and secondary extraction processes

from ores, secondary resources and wastes, Energy efficient and environmentally friendly processes, advanced materials for functional applications, structural materials and alloys, automotive, nuclear, power, energy efficient materials and coatings, waste utilization, nondestructive evaluation, mechanical behavior of materials, surface engineering of various advanced alloys and materials, corrosion and prevention, metal forming, thermo-mechanical behavior, grain boundary engineering, iron and steel making, energy & environment in metallurgical industries etc. Direct PhD course at CSIR-NML has started from January 2012 session while integrated PhD course has been initiated from August 2012 session with a total student strength of 09 students.

There are four students who are pursuing their doctoral degree and undergoing the required course work, while five students are enrolled for integrated Ph.D and have currently completed one semester of their course work. CSIR-NML has designed various courses keeping in view the scientific and technical excitements expected from younger generation as well as contemporary and futuristic scientific and industrial needs of the country specifically in field of Minerals - Metals & Materials for different industrial sectors ranging from transport to energy. Course work at CSIR-NML is being conducted through an integrated approach involving eminent faculties from prestigious academic institutions, industries (TATA STEEL) and colleagues from CSIR-NML. It will help the students in appreciating the subjects in their totality. A great support from the Engineering Division and Administrative and Finance Divisions of CSIR-NML have made it possible to create the required infrastructure and logistic support, which help AcSIR CSIR-NML to meet the objectives laid down during the inception of AcSIR.

School-NML Interactive Programme

The School-NML Interactive program (SNIP) launched by the Laboratory has become very popular. Thus far, more than 65 schools have been covered across East and West Singhbhum district of Jharkhand and the beneficiaries were more than 6250 school students of Std. VIII to XII. The program has drawn appreciation from sections of the society and the press. Several schools from neighboring states such as Odisha and Bengal have also visited NML and participated in the program. The program has been designed to inspire the students to take up a career in science and give them an exposure to the modern laboratory working practices.

5th February, 2013

(S. Srikanth)
DIRECTOR